that all the claims currently pending in this application, including those not presently being amended, have been reproduced below for the Examiner's convenience.

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1. (Amended) A projection apparatus for projecting a pattern formed on a mask held by a mask stage onto a substrate comprising:

a charged particle beam source which emits a charged particle beam;

an irradiation system which has a shaping system for shaping the charged particle beam to have an arcuate cross-section and irradiates the mask with the arcuate cross-sectional charged particle beam;

a projection optical system which projects the pattern onto the substrate, said projection optical system including a first unit having first and second magnetic lenses, and a second unit having a magnetic lens system; and

a controller arranged to change a ratio of currents to be respectively supplied to said first and second magnetic lenses to move a principal plane of said first unit.

2. (Amended) The apparatus according to claim 1, wherein said controller changes the ratio of the currents to be respectively supplied to said first and second magnetic lenses so as to correct an image distortion of said projection optical system.

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3. (Amended) The apparatus according to claim 2, wherein

said second unit includes third and fourth magnetic lenses as the magnetic lens system, and

said controller is further arranged to change a ratio of currents respectively supplied to said third and fourth magnetic lenses to move a principal plane of said second unit so as not to change an image position and magnification of said projection optical system when moving the principal plane of said first unit.

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4. (Amended) The apparatus according to claim 1, wherein

said projection apparatus further comprises an acquisition system which acquires image information indicating a feature of an image projected onto a substrate stage for supporting the substrate by measurement, and

said controller is further arranged to change the ratio of the currents to be respectively supplied to said first and second magnetic lenses so as to correct an image distortion of said projection optical system on the basis of the image information.

A24 cont

5. (Amended) The apparatus according to claim 4, wherein said acquisition system acquires image information containing information indicating a radius of an image formed on said substrate stage with the arcuate cross-sectional charged particle beam emerging from said shaping system.

Sub C1

6. (Amended) The apparatus according to claim 5, wherein said controller is further arranged to change the ratio of the currents to be respectively supplied to said first and second

and C1

magnetic lenses, so that the measured radius coincides with a theoretical radius obtained when said projection optical system has no aberration.

Sub B5

7. (Amended) The apparatus according to claim 4, wherein said acquisition system acquires image information containing information indicating an image height of an image formed on said substrate stage with the arcuate cross-sectional charged particle beam that has passed through said shaping system.

and C1

C24 cont.

8. (Amended) The apparatus according to claim 7, wherein said controller is further arranged to change the ratio of the currents to be respectively supplied to said first and second magnetic lenses, so that the actually measured image height coincides with a theoretical image height obtained when said projection optical system has no aberration.

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9. (Amended) The apparatus according to claim 4, wherein

said acquisition system comprises

an image distortion measurement mask having a transmitting system that passes therethrough a predetermined portion of the arcuate cross-sectional charged particle beam , said mask being held by said mask stage during measurement, and

a measurement unit for measuring coordinates of a position where the charged particle beam that has passed through said transmitting system becomes incident on said substrate stage, and

said acquisition system calculates image information indicating a feature of an image projected onto said substrate stage on the basis of the measured coordinates.

10. (Unamended) The apparatus according to claim 9, wherein

said image distortion measurement mask has a plurality of transmitting systems arranged arcuately, and

said measurement unit measures coordinates of respective positions where charged particle beams that have passed through said transmitting systems become incident on said substrate stage.

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A24 cont

11. (Amended) The apparatus according to claim 10, wherein

said acquisition system calculates a radius of an image projected onto said substrate stage on the basis of a plurality of measured coordinates, and

said controller is further arranged to change the ratio of the currents to be respectively supplied to said first and second magnetic lenses, so that a radius obtained by measurement coincides with a theoretical radius obtained when said projection optical system has no aberration.

12. (Amended) The apparatus according to claim 9, wherein

said acquisition system further comprises a substrate having a mark, said substrate being placed on said substrate stage during measurement, and

said measurement unit detects backscatter electrons from said substrate, thereby measuring coordinates of a position where the charged particle beam that has passed through said transmitting system becomes incident on said substrate stage.

13. (Unamended) The apparatus according to claim 12, wherein measurement of the coordinates of the incident position is performed while moving said substrate stage such that the mark moves across the position where the charged particle beam that has passed through said transmitting system becomes incident on said substrate stage.

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C24 cont

14. (Unamended) The apparatus according to claim 13, wherein said mark is a crisscross mark made of a heavy metal.

15. (Amended) A control method for a projection apparatus having a mask stage for holding a mask, a charged particle beam source which emits a charged particle beam, an irradiation system which has a shaping system for shaping the charged particle beam to have an arcuate cross-section and irradiates the mask with the arcuate cross-sectional charged particle beam, and a projection optical system which projects the pattern onto a substrate, said projection optical system including a first unit having first and second magnetic lenses, and a second unit having a magnetic lens system, said method comprising:

the acquisition step of acquiring correction information necessary for correcting aberrations of said projection optical system; and

the control step of changing a ratio of currents to be respectively supplied to said first and second magnetic lenses to move a principal plane of said first unit.

16. (Unamended) The method according to claim 15, wherein the control step comprises correcting an image distortion of said projection optical system on the basis of the correction information.

17. (Amended) The method according to claim 16, wherein

said second unit has third and fourth magnetic lenses as the magnetic lens system, and

the control step comprises changing a ratio of currents respectively supplied to said third and fourth magnetic lenses to move a principal plane of said second unit so as not to change an image position and magnification of said projection optical system when moving the principal plane of said first unit.

18. (Amended) The method according to claim 15, wherein

the acquisition step includes the measurement step of acquiring by measurement image information indicating a feature of an image projected onto a substrate stage for supporting the substrate as the correction information, and

the control step comprises correcting an image distortion of said projection optical system on the basis of the image information.

19. (Amended) The method according to claim 18, wherein the acquisition step comprises the step of acquiring image information containing information indicating a radius of an image formed on said substrate stage with the arcuate cross-sectional charged particle beam emerging from said shaping system.

15 contd

20. (Amended) The method according to claim 19, wherein the control step comprises controlling the ratio of the currents to be respectively supplied to said first and second magnetic lenses, so that the measured radius coincides with a theoretical radius obtained when said projection optical system has no aberration.

21. (Amended) The method according to claim 18, wherein the acquisition step comprises the step of acquiring image information containing information indicating an image height of an image formed on said substrate stage with the arcuate cross-sectional charged particle beam that has passed through said shaping system.

22. (Amended) The method according to claim 21, wherein the control step comprises changing the ratio of the currents to be respectively supplied to said first and second magnetic lenses, so that the actually measured image height coincides with a theoretical image height obtained when said projection optical system has no aberration.

23. (Amended) The method according to claim 15, wherein

said acquisition step comprises

the preparation step of causing said mask stage to hold an image distortion measurement mask having a transmitting system that passes therethrough a predetermined portion of the arcuate cross-sectional charged particle beam,

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the measurement step of measuring coordinates of a position where the charged particle beam that has passed through said transmitting system becomes incident on a substrate stage for supporting the substrate, and

the calculation step of calculating, as correction information necessary for correcting an image distortion of said projection optical system, image information indicating a feature of an image projected onto said substrate stage on the basis of the measured coordinates, and

the control step comprises changing the ratio of the currents to be respectively supplied to said first and second magnetic lenses to move a principal plane of said first unit so as to correct an image distortion of said projection optical system on the basis of the correction information.

24. (Unamended) The method according to claim 23, wherein

said image distortion measurement mask has a plurality of transmitting systems arranged arcuately, and

the measurement step comprises measuring coordinates of respective positions where charged particle beams that have passed through said transmitting systems become incident on said substrate stage.

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25. (Amended) The method according to claim 24, wherein

the calculation step in the acquisition step comprises calculating a radius of an image projected onto said substrate stage on the basis of a plurality of measured coordinates, and

the control step comprises changing the ratio of the currents to be respectively supplied to said first and second magnetic lenses, so that a radius obtained by measurement coincides with a theoretical radius obtained when said projection optical system has no aberration.

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26. (Unamended) The method according to claim 23, wherein

the acquisition step further comprises the step of placing a substrate having a mark on said substrate stage before measurement, and

the measurement step in the acquisition step comprises detecting backscatter electrons from said substrate, thereby measuring coordinates of a position where the charged particle beam that has passed through said transmitting system becomes incident on said substrate stage.

27. (Unamended) The method according to claim 26, wherein the measurement step comprises measuring the coordinates of the incident position while moving said substrate stage such that the mark moves across the position where the charged particle beam that has passed through said transmitting system becomes incident on said sample stage.

28. (Unamended) The method according to claim 27, wherein said mark is a crisscross mark made of a heavy metal.

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29. (Amended) A method of manufacturing a device, comprising the steps of:

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A24 concl

fixing a mask on said mask stage of said projection apparatus according to claim 1;

placing a substrate on a substrate stage of said projection apparatus; and

transferring a pattern formed on the mask onto the substrate.

Please add new claims 30-40 as follows:

--30. (New) The apparatus according to claim 1, wherein said controller is further arranged to change the ratio of the currents respectively supplied to said first and second magnetic lenses so as to correct 3rd- and 5th-order image distortions of said projection optical system.

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31. (New) The apparatus according to claim 1, wherein said controller is further arranged to change the ratio of the currents respectively supplied to said first and second magnetic lenses under a condition that a sum of the currents respectively supplied to said first and second magnetic lenses is substantially constant.

32. (New) The apparatus according to claim 3, wherein said controller is further arranged to change the ratio of the currents respectively supplied to said third and fourth magnetic lenses under a condition that a sum of the currents respectively supplied to said third and fourth magnetic lenses is substantially constant.

Sub C1

33. (New) A projection apparatus for projecting a pattern formed on a mask onto a substrate, comprising:

an irridation system which irradiates the mask with a charged particle beam emerging from a charged particle beam source;

a projection optical system which has a magnetic lens and projects the pattern onto the substrate; and

a controller arranged to control a current to be supplied to said magnetic lens so as to adjust an image distortion of said projection optical system.

34. (New) The apparatus according to claim 33, wherein said controller is further arranged to adjust 3rd- and 5th-order image distortions of said projection optical system.

35. (New) A projection apparatus for projecting a pattern formed on a mask onto a substrate, comprising:

an irradiation system which irradiates the mask with a charged particle beam emerging from a charged particle beam source;

a projection optical system which projects the pattern onto the substrate, said projection optical system including a first unit having first and second magnetic lenses and a second unit having third and fourth magnetic lenses; and

a controller arranged to change a ratio of currents to be respectively supplied to said first and second magnetic lenses to move a principal plane of said first unit and change a ratio of currents to be respectively supplied to said third and fourth magnetic lenses to move a principal plane of said second unit.

36. (New) The apparatus according to claim 35, wherein said controller is further arranged to change the ratio of the currents to be respectively supplied to said first and second magnetic lenses and the ratio of currents to be respectively supplied to said third and fourth magnetic lenses under a condition that a sum of the currents respectively supplied to said first and second magnetic lenses is substantially constant and a sum of the currents respectively supplied to said third and fourth magnetic lenses is substantially constant.

37. (New) The apparatus according to claim 35, wherein said controller is further arranged to change the ratio of the currents to be respectively supplied to said first and second magnetic lenses and the ratio of currents to be respectively supplied to said third and fourth magnetic lenses so as to adjust an image distortion of said projection optical system.

38. (New) The apparatus according to claim 35, wherein said controller is further arranged to change the ratio of the currents to be respectively supplied to said first and second magnetic lenses and the ratio of currents to be respectively supplied to said third and fourth magnetic lenses so as to adjust 3rd- and 5th-order image distortions of said projection optical system.

39. (New) A method of manufacturing a device, comprising the steps of:

transferring a circuit pattern onto a substrate using said projection apparatus of claim 33; and

developing the resultant substrate.